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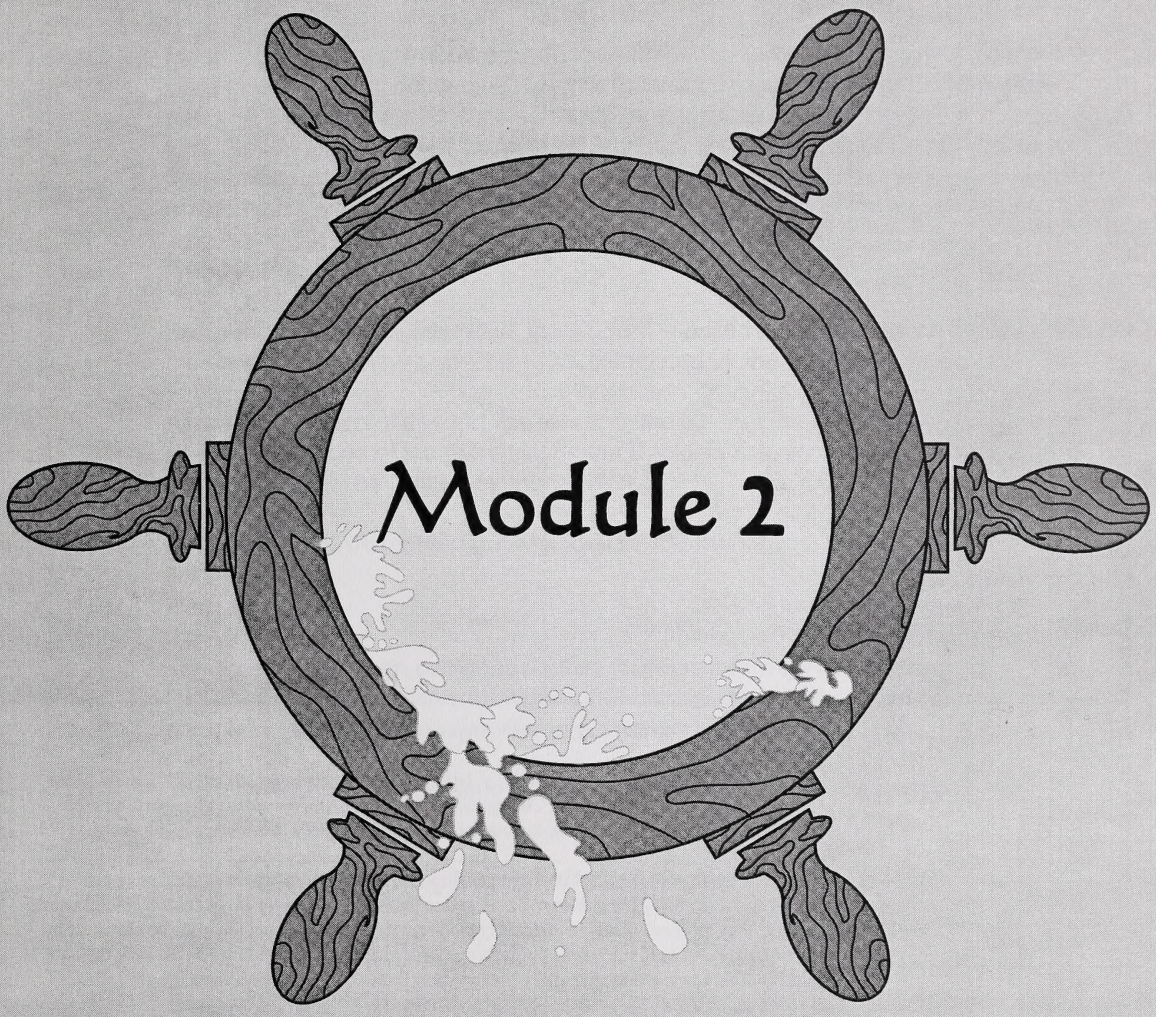
Mathematics 5



Module 2

Home Instructor's Guide and Assignment Booklet 2A

Learning Technologies Branch

Alberta LEARNING

Mathematics 5
Module 2: Patterns
Home Instructor's Guide and Assignment Booklet 2A
Learning Technologies Branch
ISBN 0-7741-1958-6

This document is intended for	
Students	✓
Teachers	✓
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Module 2: Patterns

Overview

Module 2 builds on previous experience with patterns. Students continue to develop skills in recognizing, describing, extending, and building both picture and number patterns. Special patterns such as multiples and factors are introduced and explored. In turn, these ideas are used to decide if numbers are composite or prime. Tables and diagrams are made to show patterns that can be used for solving problems. Mental mathematics and calculators, where appropriate, are used in the investigations.

Assessment

Following the Module Overview, the student is asked to begin work on the Numbers in the News project. The project is to be completed by the end of the module.

At the end of each of the first five lessons, the student is directed to complete an assignment in one of the two Assignment Booklets that accompany Module 2. The assignments will be graded by the teacher.

The module will be marked out of a total of 100 marks.

Pacing

The module has been designed so that students can work at their own pace. Each lesson, including the lesson assignment, will take the average student about one week to complete. The Challenge Activity in each lesson is optional.

You may wish to allow for time to review the basic facts. See the suggestions in Module 1.

Lesson 1: Describing Number Patterns

Overview

Lesson 1 focuses on identifying a variety of patterns. The activities include making tables to record, reveal, and extend patterns.

Special Requirements

You may gather the following materials for your student to use in this lesson:

- toothpicks

Sharing Time

Students are asked to discuss what they are learning with their home instructor three times in Lesson 1—at the end of Activity 1, at the end of Activity 2, and at the end of Activity 3.

Activity 1 Sharing Time

- The first number is 2. To get the next number add 1, to get the next number add 2, to get the next number add 3, and so on.

$$\underbrace{2,\quad 3,\quad 5,\quad 8,}\quad 12$$
$$\begin{matrix} 2+1 & 3+2 & 5+3 & 8+4 \\ =3 & =5 & =8 & =12 \end{matrix}$$

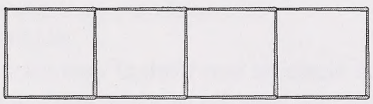
- Add the first and second numbers to get the third number, add the second and third numbers to get the fourth number, add the third and fourth numbers to get the fifth number, and so on.

$$\underbrace{2,\quad 3,\quad 5,\quad 8,}\quad 13$$
$$\begin{matrix} 2+3 & 3+5 & 5+8 \\ =5 & =8 & =13 \end{matrix}$$

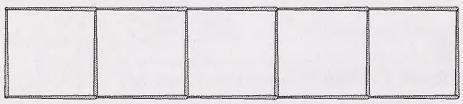
Activity 2 Sharing Time

Practice and Homework Book, page 5, questions 1 to 3

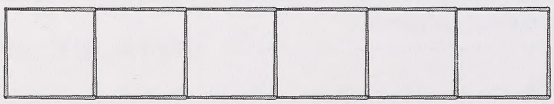
1.



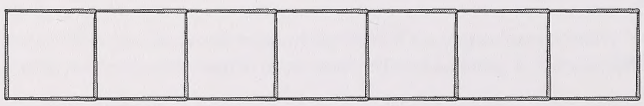
4 squares
13 toothpicks



5 squares
16 toothpicks



6 squares
19 toothpicks



7 squares
22 toothpicks

Number of Squares	Total Number of Toothpicks
1	4
2	7
3	10
4	13
5	16
6	19
7	22
8	25
9	28
10	31
11	34
12	37
13	40

2. The total number of toothpicks for each train is 3 more than the previous train.

3. Multiply the number of squares by 3 and add 1.

Activity 3 Sharing Time

Practice and Homework Book, page 11, questions 1 to 4
The number pairs will vary. Following are sample answers.

1.

Input	Output
18	9
24	12
30	15
2	1
4	2
6	3
8	4
10	5

Rule: Divide by 2.

2.

Input	Output
24	12
32	14
48	18
4	7
8	8
12	9
16	10
20	11

Rule: Divide by 4 and add 6.

3.

Input	Output
6	34
9	49
10	54
1	9
2	14
3	19
4	24
5	29

Rule: Multiply by 5 and add 4.

4.

Input	Output
10	2
18	4
34	8
6	1
14	3
22	5
26	6
30	7

Rule: Subtract 2 and divide by 4.

Lesson 2: 2-D and 3-D Patterns

Overview

Lesson 2 focuses on patterns that grow in two and three dimensions. The activities include extending given patterns and building patterns from descriptions.

Special Requirements

You may gather the following materials for your student to use in this lesson:

- a set of base ten blocks
- a set of pattern blocks
- toothpicks

Sharing Time

Students are asked to discuss what they are learning with their home instructor once in Lesson 2—at the end of Activity 3.

Practice and Homework Book, page 3, questions 1 and 2

1. The total number of tiles is the length of the bridge plus 2.

Length of Bridge	Number of Tiles
3	5
4	6
5	7
6	8
7	9
8	10
9	11
10	12

2. The total number of tiles is 3 times the number of tunnels plus 2.

Number of Tunnels	Number of Tiles
1	5
2	8
3	11
4	14
5	17
6	20
7	23
8	26

Lesson 3: Using Patterns to Solve Problems

Overview

Lesson 3 focuses on using patterns to solve problems. The activities include making tables and looking for patterns. Special charts such as Carroll diagrams and Venn diagrams are used to solve logic problems.

Sharing Time

Students are asked to discuss what they are learning with their home instructor once in Lesson 3—at the end of Activity 1.

Activity 1 Sharing Time

Practice and Homework Book, page 15, question 1

1. It will take 7 days until you have more than $1000.

Day	Amount ($)
1	1
2	3
3	9
4	27
5	81
6	243
7	729
	1093

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ASSIGNMENT BOOKLET 2A

Mathematics 5

Module 2: Lesson 1 Assignment, Lesson 2 Assignment, and Lesson 3 Assignment

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Date Assignment Received:

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Grading:

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Teacher's Comments

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Teacher's Signature

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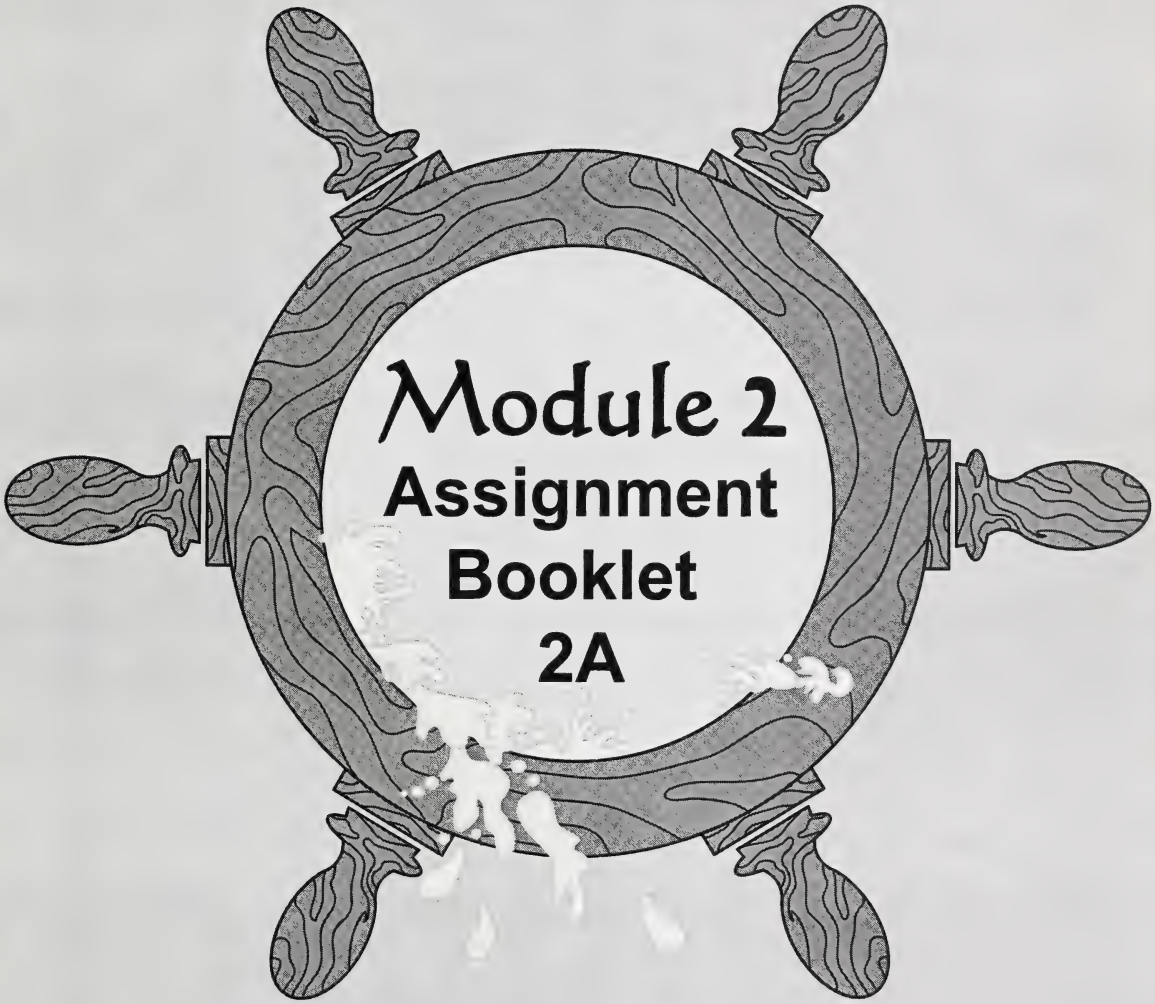

Module 2
Assignment Booklet 2A

Patterns

Learning Technologies Branch

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Summary

	Total Possible Marks	Your Mark
Lesson 1 Assignment	14	
Lesson 2 Assignment	21	
Lesson 3 Assignment	22	
	57	

Teacher's Comments

Mathematics 5
Module 2: Patterns
Assignment Booklet 2A
Lesson 1 Assignment, Lesson 2 Assignment, and Lesson 3 Assignment
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ASSIGNMENT BOOKLET 2A
MATHEMATICS 5—MODULE 2: PATTERNS

Your mark on this module will be determined by how well you do your assignments in the Assignment Booklets.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate lessons.

There are three lesson assignments in this Assignment Booklet. The total value of these assignments is 57 marks. The value of each assignment is stated in the left margin.

Be sure to proofread each assignment carefully.

14

Lesson 1 Assignment: Describing Number Patterns

Turn to page 16 in your textbook. Do questions 1 to 4 of Practise Your Skills.

Practise Your Skills, question 1

(2)

Number of Hours	Money Earned
1	$7.00
2	$14.00
3	$21.00
4	
5	

(2) **Practise Your Skills, question 2**

Show your work.

How much money would be earned?

- in 10 hours? _____
- in 15 hours? _____

(5) **Practise Your Skills, question 3**

Write the next three numbers in the pattern. Explain the rule you used.

5, 9, 13, 17, _____, _____, _____

Rule: _____

_____

(5) Practise Your Skills, question 4

Write the next three numbers in the pattern. Explain the rule you used.

96, 84, 72, 60, _____, _____, _____

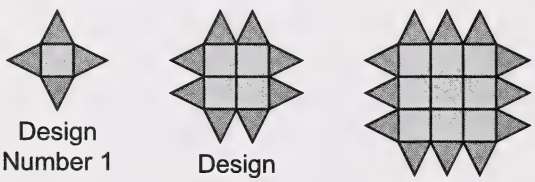
Rule: _____

_____

_____

(21) ## Lesson 2 Assignment: 2-D and 3-D Patterns

1. Sharon is making flowers with the triangles and squares in a set of pattern blocks. The first three flower designs in the pattern are shown below.



Design Number 1 Design Number 2 Design Number 3

(2) **a.** Complete the following table to show the number of triangles and the number of squares for the first six flowers in the pattern.

Design Number	1	2	3	4	5	6
Number of Squares						
Number of Triangles						

(4) **b.** Describe at least two patterns you see in the numbers on your table.

(2) **c.** Write a description of Design Number 4 of this pattern.

(2) **d.** Find the number of triangles and the number of squares you will need to build the design number 10 of the flower pattern.

(2) **e.** What is the design number of the largest flower Sharon can build if she has 150 triangles and 125 squares?

Explain your thinking.

2. Abe made a growing pattern with square tiles and then drew pictures to show it. The first picture was a single square. The second picture had 2 rows and a total of 4 squares. The third picture had 3 rows and a total of 9 squares. The fourth picture had 4 rows and a total of 16 squares. He continued his pattern, making the next three shapes.

(4) **a.** Draw pictures to show how Abe's first four pictures might look.

(2) **b.** Complete the following T-table.

Picture Number	Total Number of Squares
1	
2	
3	
4	

(1) **c.** Describe the relationship between the picture number and the total number of squares in the picture.

_____

_____

_____

(2) **d.** Using the relationship you see, extend the T-table in question 2.b. for Abe's next four shapes.

Picture Number	Total Number of Squares
5	
6	
7	
8	

22

Lesson 3 Assignment: Using Patterns to Solve Problems

1. The community centre charged $1 to see a movie. On the first day, $25 was collected. On the second day, $17 more was collected than on the first day; at the end of the second day, the club had collected $67 in total. On the third day, $17 more was collected than on the second day. At the end of the third day, the club had collected $124 in total. If the pattern continues, by the end of what day will the club have collected at least $500?

(2) **a.** Complete the table by extending it far enough for you to solve the problem.

Day 1	Amount Collected on That Day ($)	Total Collected So Far ($)
1	25	25
2	25 + 17 = 42	25 + 42 = 67
3	42 + 17 = 59	67 + 59 = 126

(1) **b.** Describe how the amount collected each day increases.

_____

_____

(1) **c.** Describe how the total amount collected increases.

_____

_____

(1) **d.** How many days did it take to collect at least $500? What was the exact amount collected at that point?

_____

_____

2. Four friends, Dora, Charlie, Reg, and Tania, each have a different pet: a cat, a rabbit, a dog, or a turtle. Use the following clues to match each friend with his or her pet.

- No one has a pet that starts with the same letter as his or her name.
- Dora is allergic to cats.
- Tania doesn't have a rabbit or a dog.
- Charlie has a dog or a turtle.
- Reg's pet is fluffy.

(3) **a.** Use logical reasoning and complete the following Carroll diagram matching the friends with their pets. Write **yes** in the cell that matches that person to that pet. Write **no** in the cells that do not match that person to that pet.

	Dora	Charlie	Reg	Tania
Cat				
Rabbit				
Dog				
Turtle				

(1) **b.** Tell what kind of pet each person has.

_____

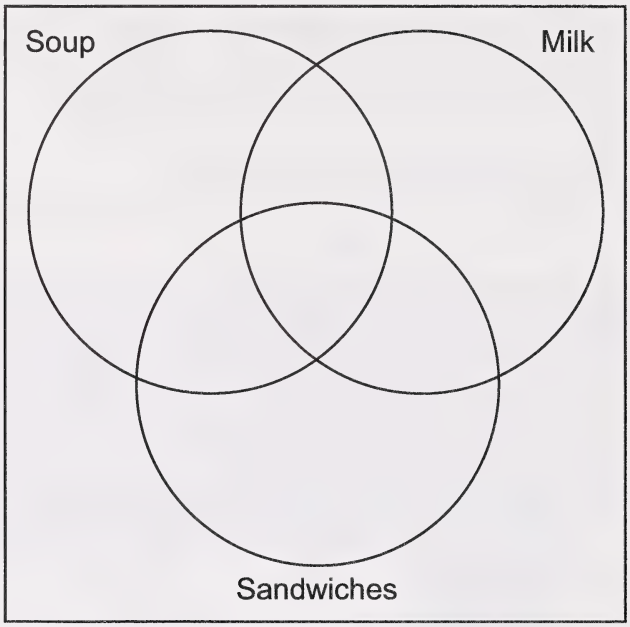
_____

_____

_____

3. When a group of friends went out for lunch, 8 ordered soup, 7 ordered sandwiches, and 9 ordered milk. Three ordered only soup, 2 ordered only milk and soup, 3 ordered only a sandwich and milk, and 2 ordered all three items.

(2) **a.** Use logical reasoning to complete the following Venn diagram.



(1) **b.** How many people ordered only milk?

_____

(1) **c.** How many people ordered only soup and a sandwich?

_____

(1) **d.** How many people ordered only a sandwich?

_____

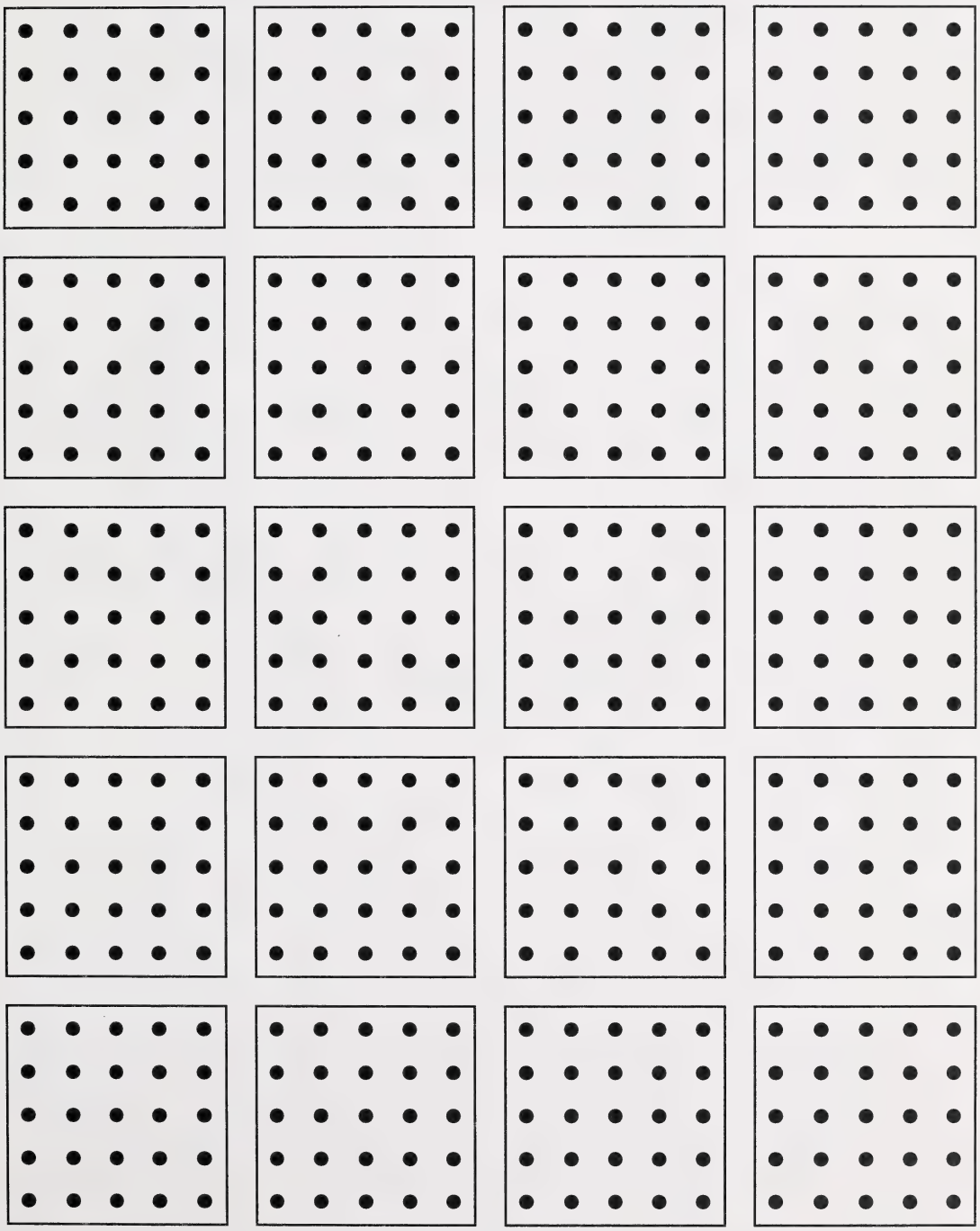
(1) **e.** How many people didn't order milk?

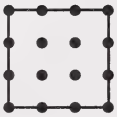
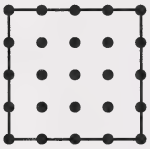
_____

(1) **f.** What is the total number of friends that went out for lunch?

_____

(6) **4.** How many squares are on a 5 by 5 geoboard if you connect the dots using only horizontal and vertical lines? Use the dot paper provided to find all the squares. Then complete the following table on the next page.



Size of Squares	Number of Squares That Size
	
	

Total _____

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Mathematics 5

Module 2

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Lesson 4: Multiples and Factors

Overview

Lesson 4 focuses on the meaning of multiples and factors. The activities include exploring and extending patterns of multiples. Factors are identified and related to multiples.

Special Requirements

You may gather the following materials with your student for use in this lesson:

- set of pattern blocks
- two kinds of counters (red and black checkers, two kinds of coins, two kinds of dried beans, etc.)

Sharing Time

Students are asked to discuss what they are learning with their home instructor once in Lesson 4—at the end of Activity 3.

Lesson 5: Composite and Prime Numbers

Overview

Lesson 5 focuses on developing the meaning of composite and prime numbers. Arrays that show factors of numbers are used to identify composites and primes. The activities include solving problems using these ideas.

Special Requirements

You may gather the following materials with your student for use in this lesson:

- small square tiles
- grid paper (graph paper)

Module Summary

In the Module Summary students are asked to complete the Numbers in the News project and send the completed project with Assignment Booklet 2B to the teacher.

Following the Module Summary are Keystrokes and Review. These special activities can be assigned at a later time to review the module ideas and prepare for the final test.

ASSIGNMENT BOOKLET 2B

Mathematics 5

Module 2: Lesson 4 Assignment, Lesson 5 Assignment, and Numbers in the News

Home Instructor's and Student's Comments:

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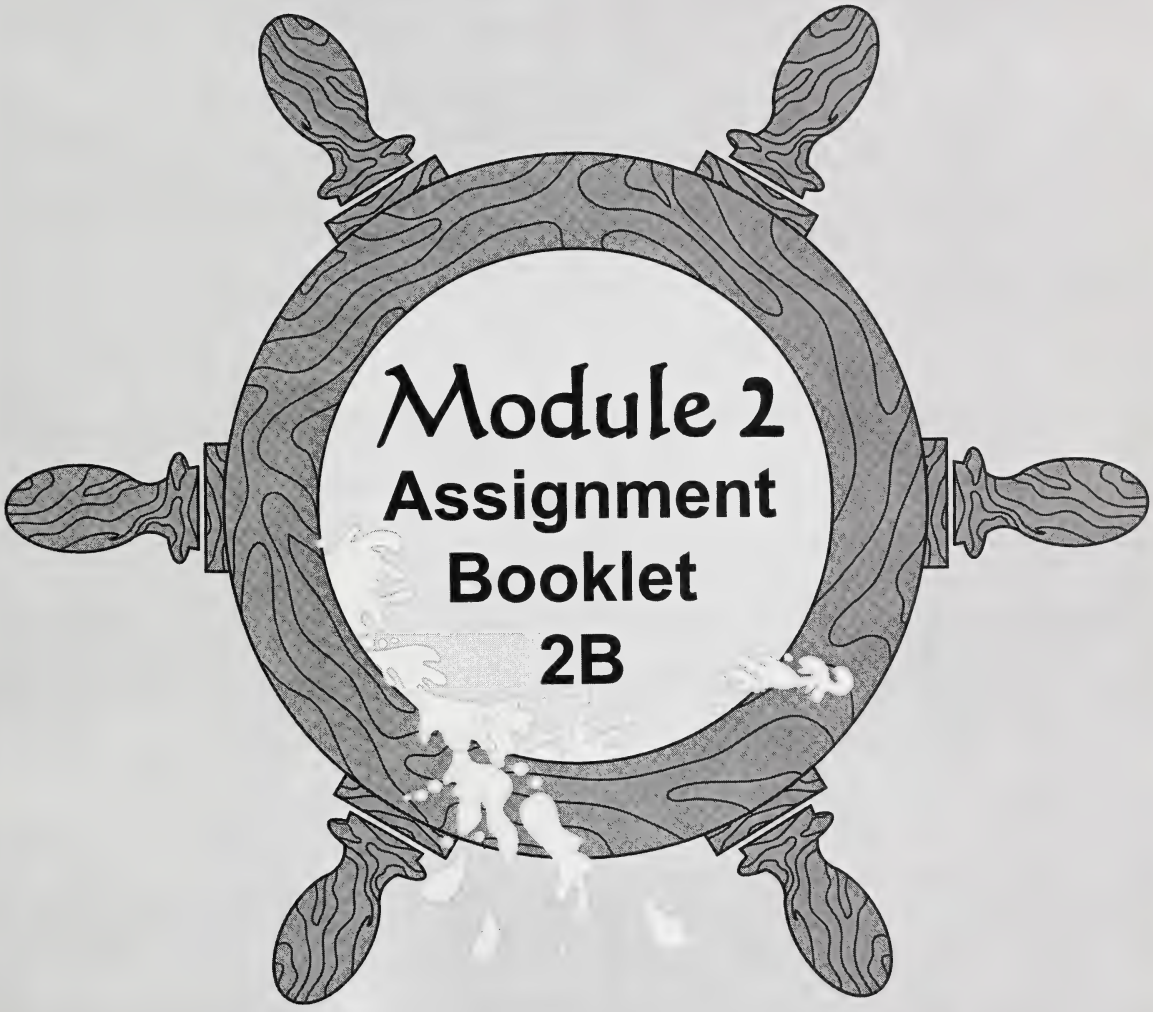

Module 2
Assignment Booklet 2B

Patterns

Learning Technologies Branch

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Summary

	Total Possible Marks	Your Mark
Lesson 4 Assignment	16	
Lesson 5 Assignment	17	
Numbers in the News	10	
	43	

Teacher's Comments

Mathematics 5
Module 2: Patterns
Assignment Booklet 2B
Lesson 4 Assignment, Lesson 5 Assignment, and Numbers in the News
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ASSIGNMENT BOOKLET 2B
MATHEMATICS 5—MODULE 2: PATTERNS

Your mark on this module will be determined by how well you do your assignments in the Assignment Booklets.

Work slowly and carefully. If you are having difficulties, go back and review the appropriate lessons.

There are two lesson assignments and a Numbers in the News project in this Assignment Booklet. The total value of these assignments is 43 marks. The value of each assignment is stated in the left margin.

Be sure to proofread each assignment carefully.

(16)

Lesson 4 Assignment: Multiples and Factors

1. Jason's mom loaned him $400 to buy a new bike. From the money he makes on his paper route, Jason pays his mom back $25 each month.

(2)

a. Complete the table to show the monthly payments and the total amount he will have paid back by the end of each month for one year.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Total Paid												

(2)

b. Explain how you can use the constant function on your calculator to display the numbers you put in your table.

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(1) **c.** Look at the numbers in your table in question 1.a. How are all the monthly totals related to the monthly payment of $25?

(1) **d.** What repeating pattern do you see in the monthly totals?

(1) **e.** After the first year, Jason continued making payments in the same way. Using your answer to question 1.d., would his monthly total ever be $335? Explain.

(1) **f.** How many more payments must Jason make after one year?

(2) **2. a.** Draw pictures that show how to use tiles to find all the factor pairs of 18.

(1) **b.** Write all the factor pairs.

(2) **3. a.** Complete the table to find all the factors of 32.

Number Tried	Test it using division.	Is it a factor?	What is the other factor in the pair?
1	$32 \div 1 = 32$	yes	32
2	$32 \div 2 = 16$	yes	16
3	$32 \div 3 = 10$ R2	no	—

(2) **b.** Explain how you know when you have tested enough numbers.

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_____

(1) **c.** Write all the factors of 32 from least to greatest.

_____

17

Lesson 5 Assignment: Composite and Prime Numbers

1. The 37 members of the Bunny family were having a reunion. To take pictures, they wanted to divide all the family members into equal-sized groups, with no one left out. Help the Bunny family decide which equal-sized groups, if any, they can make.

(2) **a.** Use Rhadia's method from Activity 3 of Lesson 5. Draw diagrams that show how to use either tiles or shaded grid squares to solve the problem.

(1) **b.** Explain how you know when you don't have to try any more arrays.

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(2) **c.** Use Mandy's method from Activities 2 and 3 of Lesson 5. Complete the following table to solve the problem.

Factor Tried	Test it using division.	Is it a factor?	What is the other factor in the pair?

(1) **d.** Explain how you will know when you have tried enough factors.

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2. Claire bought several packages of collector cards. After she opened them, she counted a total of 91 cards. Could there have been the same number of cards in each package?

(2) **a.** Use Rhadia's method from Activity 3 of Lesson 5. Draw diagrams that show how to use either tiles or shaded grid squares to solve the problem.

(1) **b.** Explain how you know when you don't have to try any more arrays.

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_____

(2) **c.** Use Mandy's method from Activities 2 and 3 of Lesson 5. Complete the following table to solve the problem.

Factor Tried	Test it using division.	Is it a factor?	What is the other factor in the pair?

(1) **d.** Explain how you will know when you have tried enough factors.

_____

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_____

(3) **3.** Every even number greater than 2 can be written as the sum of two prime numbers. Find the sums that show this is true for the first six even numbers greater than 2.

_____ _____

_____ _____

_____ _____

(2) **4.** Explain why you think it is useful to be able to tell if a number is prime or composite.

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(10) ## Numbers in the News

Scavenger Hunt

Go through the scavenger hunt list for Module 2 to make sure you have clipped at least one sample for each question. Ask your home instructor to check the samples you found. Choose the samples you wish to use, and label each one with the scavenger hunt number it matches. Organize your samples and put them together with any other information required. Submit your project with this Assignment Booklet.

Ask yourself the following questions:

- Is my Numbers in the News project complete? (Have I included all my samples?)
- Do my samples show the ideas clearly? (Are my examples appropriate?)
- Did I take care to be neat when organizing and labelling my work?

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